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Prescribers' views and experiences of using direct acting oral anticoagulants in the management of nonvalvular atrial fibrillation: a survey in remote and rural Scotland.

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Aim

A recent systematic review highlighted the lack of robust studies on prescribers' perspectives of direct-acting oral anticoagulants (DOACs) for non-valvular atrial fibrillation (AF). The aim was to determine prescribers' views and experiences of prescribing DOACs.

Methods

A cross-sectional survey of prescribers in a remote and rural area of Scotland. Survey items were: demographics; prescribing of DOACs; views of potential influences on DOAC prescribing; knowledge of prescribing guidelines; and experiences. Items on potential influences were based on the Theoretical Domains Framework (TDF). Data were analysed using descriptive and inferential statistics, and content analysis of responses to open questions. Principal component analysis (PCA) was performed on the items of potential influences.

Results

One hundred and fifty-four responses were received, 120 (77.9%) from doctors, 18 (11.7%) from nurse prescribers and 10 (6.4%) from pharmacist prescribers (6 missing). PCA of the TDF items of potential influences gave four components. Component scores for (i) role of professionals, their knowledge and skills and (ii) influences on prescribing were positive. Those for (iii) consequences of prescribing and (iv) monitoring for safety and effectiveness were more neutral. There were low levels of agreement for statements relating to DOACs being more effective, safer and cost-effective than warfarin. There were similar responses around the complexity of bleeding management and detection of over and under-anticoagulation.

Conclusion

This study has identified several key issues of DOAC prescribing (e.g. bleeding management) hence further emphasis is required in continuing professional development and during guideline implementation and evaluation.

What is already known about this subject

- Little attention has been paid to prescribers' views and experiences DOACs in the management of non-valvular AF
- A recent systematic review identified only nine surveys and one qualitative study, with key limitations in study design and reporting hence views and experiences are relatively unknown

What this study adds

- This study is a theory based cross-sectional survey of prescribers in a remote and rural area of Scotland
- Findings identified a lack of awareness of the evidence base of the effectiveness, safety and cost-effectiveness of DOACs. There were issues around the management of DOAC related bleeding and the identification of over and under-anticoagulation.
- Further emphasis of these aspects are required during continuing professional development, and implementation and evaluation of guidelines.

Introduction

The management of non-valvular atrial fibrillation (AF) significantly altered with the advent of the direct-acting oral anticoagulants (DOACs) dabigatran, rivaroxaban, apixaban and edoxaban. DOACs have replaced warfarin as first line in many national and international guidelines and policy statements, including those of the National Institute for Health and Care Excellence in England and Wales [1], the American College of Cardiology/American Heart Association Task Force on Practice Guidelines/Heart Rhythm Society [2], the European Society of Cardiology [3], and the European Heart Rhythm Association [4].

Guideline recommendations are based on the evidence collated in systematic reviews and meta-analyses of efficacy, effectiveness and safety. The perspectives of prescribers on this new class of pharmacological agents has, however, received much less attention. The only systematic review of prescribers' views and experiences of DOACs, published in 2018, yielded only ten peer-reviewed studies from January 2006 to July 2017 [5]. Cross-sectional surveys, conducted in Europe and North America, reported views and experiences of general practitioners (GPs), cardiologists, general internists, hospital doctors, non-medical prescribers, members of associations and research networks. Study aims were heterogeneous, as were the specific questionnaire domains and items. Two studies reported factors influencing DOAC use [6,7]; six preference for DOACs over warfarin [6-11]; two issues with clinical guidelines [8,12]; and three issues in DOAC use [7,9,13]. In the six studies of prescriber preference, DOACs were first choice for warfarin naïve patients, largely based on perceptions of effectiveness, and were considered advantageous in patients with unstable International Normalized Ratios or likely to miss appointments. Concerns mainly related to the management of over anticoagulation and bleeding.

The findings of these surveys, and hence the systematic review, are limited by the response rates of 9-35.9%, with participant numbers ranging from 38-450 [5]. One further limitation is the omission of theory (e.g. cognitive, behavioural, organisational) as part of questionnaire development. Considering the theoretical basis will yield a data collection tool with comprehensive coverage of all key factors leading to more valid findings [14,15]. There is therefore a need to systematically research the views and experiences of prescribers, using a robust approach which will take account of these limitations. This will allow elucidation of positive and negative views and factors influencing prescribing which could be used to further optimise DOAC use.

The aim of this study was to apply theory to determine prescribers' views and experiences of prescribing DOACs for the management of non-valvular AF.

Method

Research design

The design was a cross-sectional survey using an online questionnaire.

Setting

The research was conducted across primary and secondary care within NHS Highland in Scotland. This is an area of low population density covering approximately 40% of the land mass of Scotland yet representing only 6% of the Scottish population. Forty percent of residents are within 'remote rural' locations [16]. Responsibility for the management of stroke prevention in patients with AF is usually undertaken in primary care although patients can also be initiated on therapy in secondary care if they attend outpatient clinics or during admission.

Inclusion and exclusion criteria

All medical prescribers of all grades and non-medical prescribers (e.g. nurse and pharmacist independent prescribers) were invited to participate, with no exclusions.

Questionnaire development

A draft questionnaire was developed based on the recent systematic review conducted by the research team [5]. The draft was reviewed for face and content validity by six experienced researchers and practitioners identified from professional networks followed by 'think aloud testing' with one medical and one non-medical prescriber. Piloting was undertaken in a sample of 30 prescribers based outside NHS Highland. The final version of the questionnaire was formatted in Snap 10 Professional® (software for web and email questionnaire design, publication, data entry and analysis) and tested for compatibility with platforms (e.g. tablet, smartphone), browsers, and NHS email and internet filters.

Questionnaire items were grouped into sections of: demographics; DOAC prescribing (approximate frequency of initiation, switching and discontinuation); potential influences on DOAC prescribing; knowledge of local prescribing guidelines; and experiences. Question types were closed, 5-point Likert scales and open to allow comment. Items on potential influences on prescribing were based on the Theoretical Domains Framework (TDF, derived from the constructs of 33 behaviour change theories) [17]. TDF domains of determinants (influences) of behaviour are clustered into: knowledge; skills;

social/professional role and identity; beliefs about capabilities; optimism; beliefs about consequences; reinforcement; intentions; goals; memory, attention and decision processes; environmental context and resources; social influences; emotions; and behavioral regulation. The TDF Determinants of Implementation Behavior Questionnaire (DIQB) was used in the development of the individual items. DIQB is a valid and reliable tool with items aligned to each of the TDF domains which researchers can select and adapt those relevant to the behaviour under study (i.e. prescribing DOACs) [18]. In the personal demographics section, respondents classified themselves as 'innovators', 'early adopters', 'early majority', 'late majority' and 'laggards' based on receptivity to change [19].

Data collection

An email with a link to the participant information leaflet and questionnaire was sent to all prescribers within the NHS Highland database. The email indicated that the questionnaire be completed only by those either currently prescribing DOACs or likely to do so in the near future. The following evidence based measures were adopted to maximise survey response rate: two email reminders sent at 4-weekly intervals; an information leaflet outlining the study aim, potential benefits and assuring anonymity; and a visually attractive questionnaire [20]. Data collection took place from April to July 2017.

Data analysis

Data were analysed using descriptive and inferential statistics, and content analysis of responses to open items. The 5-point Likert scale TDF items were subjected to principal components analysis (PCA) to reduce the large number of items to a smaller, more manageable number of components [21]. Data suitability for PCA was tested via determination of the: correlation matrix for co-efficients (≥0.3); Kaiser-Meyer-Olkin measure of sampling adequacy (≥0.6); and Bartlett's test of sphericity (≤0.05). The number of components was determined via Eigenvalues >1 and visual inspection of the scree plot. Varimax rotation was used to aid the interpretation of the components as, from a theoretical perspective, there was reason to assume that selected attitudinal items were correlated; missing data were excluded pairwise [22]. Where items cross loaded onto more than one component, the item was captured within the component of highest loading. Internal consistencies of the resulting component(s) were tested using Cronbach's alpha, aiming for >0.60 as desirable for psychometric scales [21]. Total component scores were obtained by assigning scores of 1 (strongly disagree) to 5 (strongly agree) to each of the Likert statement responses, with negatively worded items being reverse scored, and generating a summed score for each component. Differences

in total component scores between demographic groupings (medical/non-medical prescriber, setting, experience as health professional and prescriber) were tested using Mann-Whitney U test (2 groups) or Kruskal-Wallis (>2 groups). Free text comments were handled using a content analysis approach [23].

Ethics

This study was approved by the Ethical Review Panel of the School of Pharmacy and Life Sciences at Robert Gordon University, UK; the North of Scotland Research Ethics Committee advised that the study was exempt from NHS ethical review. Management approval was obtained from NHS Highland Research and Development Committee (ID1158).

Results

Demographics

One hundred and fifty-four responses were received, 120 (77.9%) from doctors (including 76 general practitioners), 18 (11.7%) from nurse prescribers and 10 (6.4%) from pharmacist prescribers (6 missing). Respondents had a mean age of 43.3 years (standard deviation 11.9 years). Just over half (n=84, 54.5%) had twenty of more years' experience as health professionals and slightly less (n=61, 39.6%) as prescribers. Around one quarter (n=34, 22.1%) rated themselves as 'innovators', 25 (16.2%) as 'early adopters' and none as 'laggards' (Table 1). A response rate could not be calculated as the total number of prescribers either currently prescribing DOACs or likely to do so in the near future was unknown.

DOAC prescribing

Current practice relating to DOAC prescribing is given in Table 2. The most common behaviour was continuing DOACs if initiated by others (n=112, 72.8% weekly or monthly). Sixty-six respondents (42.9%) initiated DOACs either weekly or monthly. Sixteen respondents (10.4%) never prescribed DOACs and had no plans to prescribe in the future, hence were removed from any further analysis. These sixteen were seven nurses, five doctors, two physiotherapists, one pharmacist and one podiatrist.

Knowledge of NHS Highland Guidelines

While respondents were largely aware of the guidelines in terms of when to consider DOACs (correct response n=99, 71.9%) and that dabigatran was the DOAC of choice [at the time of the study] (correct response n=99, 71.9%), fewer knew that apixaban was not the second choice (correct response n=76, 57.2%) and that patients must be able to swallow capsules whole before prescribing dabigatran (correct response n=67, 48.6%)

Principal component analysis

When items on potential influences on prescribing were subjected to PCA, the correlation matrix contained multiple coefficients above 0.3. The Kaiser–Meyer–Olkin measure of sampling adequacy (0.721) and Bartlett's test of sphericity (significance <0.001) confirmed the factorability of the items. Consideration of the number of components with Eigenvalues exceeding 1.0 and the Scree plot gave a four-factor solution explaining of 48.9% of the variance. The four components were labelled: 'the role of professionals, their knowledge and skills' (Cronbach's alpha 0.904); 'influences on prescribing' (Cronbach's alpha 0.802); 'consequences of prescribing' (Cronbach's alpha 0.714); and 'monitoring for safety and effectiveness' (Cronbach's alpha 0.612).

Component 1 'the role of professionals, their knowledge and skills' (Table 3)

Respondents generally held positive views, with a median overall score of 61 (IQR 54-64), range possible 16-80 (midpoint 48), with 80 representing the highest possible positive score. The statements with the lowest levels of agreement were 'I find the guidelines on DOACs easy to interpret' (agree/strongly agree n=58, 42.1%) and 'I have sufficient knowledge of how to manage adverse reactions of DOACs' (agree/strongly agree n=64, 46.4%). Two thirds (n=92, 66.7%) agreed/strongly agreed that they were competent to initiate DOACs and slightly less (n=85, 61.6%) confident. Just over one quarter (n=36, 26.0%) found it difficult to decide between DOACs or warfarin. Component 1 scores were statistically significantly higher for those based in primary care (Mann-Whitney U, $p<0.05$), more experienced as health professionals (Kruskal-Wallis, $p<0.05$) and more experienced as prescribers (Kruskal-Wallis, $p<0.001$).

Component 2 'influences on prescribing' (Table 4)

With a median value of 19 and IQR of 17-20 (5-25, midpoint 15), respondents generally gave positive responses. The statements with the lowest levels of positive responses were 'cost is a deterrent to my prescribing of DOACs' (agree/strongly agree n=40, 29.0%) and 'potentially increased scrutiny of my prescribing by the health board is a deterrent to my prescribing of DOACs' (agree/strongly agree n=27, 19.6%). Component 2 scores were statistically significantly higher for those based in secondary care (Mann-Whitney U, $p<0.05$).

Component 3 'consequences of prescribing' (Table 5)

Responses to this component were generally more neutral with a median value of 19 and IQR of 17-21.25 (range possible 6-30, midpoint 18) respondents generally gave more neutral responses. Fifty-three respondents (38.4%) scored the midscale point of 18 or less. The statements with the lowest levels of agreement were around patients being treated more effectively with DOACs compared to warfarin (agree/strongly agree n=39, 28.2%), having less adverse effects (agree/strongly agree n=28, 20.3%) and being treated more cost-effectively (agree/strongly agree n=23, 16.7%). Component 3 scores were statistically significantly higher for those based with less experience as prescribers (Kruskal-Wallis, $p<0.05$).

Component 4 'monitoring for safety and effectiveness' (Table 6)

With a median value of 17 and IQR of 14-19 (minimum 9, maximum 25), respondents gave more neutral responses. Thirty-eight respondents (27.5%) of respondents scored the midscale point of 15 or less. Respondents were largely in agreement that

management of bleeding on DOACs was more complex than warfarin (agree/strongly agree n=89, 42.8%). Just under half agreed/strongly agreed that over-anticoagulation (n=59, 42.8%) and under-anticoagulation (n=60, 43.4%) with DOACs would not be easily detected.

Component 4 scores were statistically significantly higher for those with more experience as prescribers (Kruskal-Wallis, $p<0.05$).

There were no significant differences between medical and non-medical prescribers for any of the components (Mann-Whitney U test, $p>0.05$).

Content analysis of the responses to the open questions identified that the overwhelming perceived benefit was the absence of need for INR monitoring, with the main limitations being the lack of a suitable reversal agent and ability to monitor anticoagulation status.

Discussion

Statement of key findings

This survey captured data from mostly experienced medical and non-medical prescribers across different settings. PCA of the TDF determinants gave four components of: the role of professionals, their knowledge and skills; influences on prescribing; consequences of prescribing; and monitoring for safety and effectiveness. While component scores for the role of professionals, their knowledge and skills, and influences on prescribing were positive, those for the other two components were more neutral. There were low levels of agreement for statements relating to more effective, safer and cost-effective treatment when prescribing DOACs rather than warfarin. There were similar responses around the complexity of bleeding management and detection of over and under-anticoagulation. The lack of need for INR monitoring was, however, identified as a positive aspect of DOAC use.

Strengths and weaknesses

This study adds to the limited evidence base on prescribers' perspectives of DOAC use for non-valvular AF, as identified in a recently published systematic review [5]. Furthermore, this is the first study which based questionnaire items on a theoretical framework thus increasing the likely construct and criterion validity. There are, however, several limitations to the study hence the findings should be interpreted with caution. Although a response rate could not be determined, the number of responses, particularly from secondary care, appears low. As a self-reported study it may be subject to biases such as social desirability and acquiescence biases. Furthermore, the study was conducted in one remote and rural geographical area of Scotland thus the results and conclusions may lack external validity.

Interpretation

This study is both relevant and timely given the increase in DOAC prescribing [24], and being the first line recommendation for non-AF management in national and international guidelines [1-4]. The consequences of prescribing and monitoring for safety and effectiveness had neutral scores. While there was general agreement that implementing DOAC guidelines would be good for patients and organisations, there was markedly less agreement that patients prescribed DOACs in preference to warfarin would be treated more effectively, safely and cost-effectively. At first glance, these findings appear contradictory but it may be that prescribers consider guidelines beneficial to

patient care but are less aware of the specific evidence from which the guidelines are derived. Notably, less experienced prescribers were statistically significantly more positive in their responses, which could be as a result of more recent university and practice based education and training on DOACs or having less real world experience to question the results of even large randomised controlled trials. The majority of respondents in a survey of German physicians considered DOACs equally effective as warfarin and almost half equally safe [9].

In terms of monitoring for safety and effectiveness, few respondents disagreed that DOAC related bleeding would be more challenging to manage than warfarin. These concerns were also identified in previous surveys of European research network centres and German physicians [8,9]. Given that idarucizumab is now licensed for use and is indicated to reverse dabigatran in patients with life threatening haemorrhage or need for urgent surgery [25], and that reversal agents for other DOACs are being developed [26], it is likely that these concerns will be abated. Many respondents believed that DOAC related over and under-anticoagulation could not easily be detected. Again, less experienced prescribers were statistically significantly more positive in their responses. Analysis of the open comments also identified this as a potential issue in relation to non-adherence. The specific site of action of DOACs on the coagulation cascade, together with the predictable pharmacokinetic and pharmacodynamic properties and fixed drug dosages (other than renal impairment) eliminate the need and usefulness of INR monitoring [27].

The scores for the role of professionals, their knowledge and skills, and influences on prescribing were much more positive. Responses indicated self-reported knowledge of aspects of DOAC guidelines, evidence base and clinical pharmacology. They were aware of how to initiate and monitor DOACs, responding that this was part of their role, and that they were generally competent and confident. While there were mixed responses on deciding between DOACs and warfarin, local and national guidelines have since been updated with DOACs as first line.

For influences on prescribing, the most negative responses were in relation to cost and scrutiny by the health board. Systematic reviews of the cost-effectiveness of DOACs compared to warfarin have recommended that, while further real world data are required, DOACs are more cost-effective than warfarin despite the higher acquisition costs [28,29].

The specific findings of the more neutral components and statements with negative responses should be considered to optimise DOAC prescribing for non-valvular AF. In 2017, Healthcare Improvement Scotland updated their guidance on the use of DOACs in non-valvular AF with the publication of a rapid review of clinical effectiveness [30]. The

lack of direct comparisons between DOACs was noted hence the recommendations were based entirely on indirect evidence from published network meta-analyses. Edoxaban is now recommended as first line treatment for non-valvular AF with the other three DOACs being second line. The local guidelines in NHS Highland, along with other healthboards in Scotland, have been adapted accordingly. As well as raising awareness of the updated guidance, attention should be paid to specific aspects including the evidence base of effectiveness, safety and cost effectiveness, management of bleeding, issues of over and under-anticoagulation.

Further research

Qualitative research focusing on the implementation and consequences of the updated guidance to prescribe edoxaban is warranted. The consolidated framework for implementation research (CFIR) is an appropriate theoretical framework on which to base data generation and analysis [31].

Conclusion

This study has demonstrated that prescriber respondents in NHS Highland perceive themselves to be knowledgeable, confident and competent in the use of DOACs for non-valvular AF. There was, however, markedly less awareness of the evidence base of the effectiveness, safety and cost-effectiveness of DOACs. There were issues around the management of DOAC related bleeding and the identification of over and under-anticoagulation. Further emphasis of these aspects is required during continuing professional development, and implementation and evaluation of guidelines.

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The study was conceived by DS, SC, SJL, GFR and LM. DG led the data collection and analysis which was overseen by all authors. DS and DG wrote the first version of the manuscript which was reviewed by all authors, all of whom approved the final version.

Conflict of interest disclosure

The authors (Daria Generalova, Scott Cunningham, Stephen J Leslie, Gordon F Rushworth, Laura McIver and Derek Stewart) have no conflicts of interest to declare.

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The data that support the findings of this study are available from the corresponding author upon reasonable request.

Table 1. Respondent personal and practice demographics (N=154)

Characteristic	**% (n)**
Profession	
Doctor	77.9 (120)
Nurse prescriber	11.7 (18)
Pharmacist prescriber	6.5 (10)
Missing	3.9 (6)
Sex	
Male	42.9 (66)
Female	57.1 (88)
Highest academic qualification	
PhD	0.6 (1)
MD	4.5 (7)
MSc	13.0 (20)
Postgraduate Diploma	31.2 (48)
Postgraduate Certificate	18.2 (28)
MBChB (or equivalent)	70.8 (109)
MPharm	2.6 (4)
BSc	24.0 (37)
Practice setting	
Secondary care	32.5 (50)
Primary care	64.9 (100)
Other	3.6 (4)
Years worked as health professional	
≤5	7.1 (11)
6-10	12.3 (19)
11-15	9.7 (15)
16-20	14.9 (23)
20-25	18.2 (28)
26-30	14.3 (22)
>30	22.1 (34)
Missing	1.3 (2)
Years worked as prescriber	
≤5	16.2 (25)
6-10	17.5 (27)
11-15	13.0 (20)
16-20	11.7 (18)
20-25	12.3 (19)
26-30	12.3 (19)
>30	14.9 (23)
Missing	1.9 (3)
Responses in relation to changing professional practice	
- I resist new ways of working (laggard)	0
- I am cautious in relation to new ways of working; I tend to change once most of my peers have done so (late majority)	9.7 (15)
- I think for some time before adopting new ways of working (early majority)	51.9 (80)
- I serve as a role model for others in relation to new ways of working (early adopter)	16.2 (25)
- I am innovative with new ways of working (innovator)	22.1 (34)

Table 2. Approximate frequency of DOAC prescribing behaviours (N=154)

Prescribing behaviour	**Weekly % (n)**	**Monthly % (n)**	**Annually % (n)**	**Never % (n)**	**Missing % (n)**
Initiate DOACs	3.9 (6)	39.0 (60)	29.2 (45)	26.6 (41)	1.3 (2)
Switch individual patients from warfarin to DOACs	0.6 (1)	18.2 (28)	40.9 (63)	38.3 (59)	1.9 (3)
Switch individual patients from DOACs to warfarin	0	5.2 (8)	31.2 (48)	63.6 (98)	0
Continue DOACs if initiated by others	32.5 (50)	40.3 (62)	10.4 (16)	16.9 (26)	0
Discontinue DOACs	1.3 (2)	22.7 (35)	44.2 (68)	31.2 (48)	0.6 (1)

Table 3. Component 1, responses to items related to 'the role of professionals, their knowledge and skills' (N=138)

Statement	Strongly agree % (n)	Agree % (n)	Unsure % (n)	Disagree % (n)	Strongly disagree % (n)	Missing % (n)
I have sufficient knowledge of the NHS Highland guideline to allow me to prescribe DOACs appropriately	8.0 (11)	62.3 (86)	10.9 (15)	10.1 (14)	4.3 (6)	4.3 (6)
I have sufficient knowledge of the clinical pharmacology of DOACs to allow me to prescribe these safely and effectively	8.0 (11)	58.7 (81)	15.2 (21)	11.6 (16)	2.2 (3)	4.3 (6)
I have sufficient knowledge of the evidence base of DOACs to allow me to prescribe these safely and effectively	8.0 (11)	58.0 (80)	13.0 (18)	13.8 (19)	2.9 (4)	4.3 (6)
I have sufficient knowledge of how to initiate the prescribing of DOACs	10.1 (14)	65.9 (91)	6.5 (9)	10.9 (15)	1.4 (2)	5.1 (7)
I have sufficient knowledge of how to monitor the effectiveness and toxicity of DOACs	6.5 (9)	48.6 (67)	23.9 (33)	14.5 (20)	2.2 (3)	4.3 (6)
I have sufficient knowledge of how to manage adverse reactions of DOACs	5.8 (8)	40.6 (56)	26.1 (36)	20.3 (28)	2.9 (4)	4.3 (6)
It is part of my role to initiate the prescribing of DOACs	17.4 (24)	52.2 (72)	5.1 (7)	14.5 (20)	5.1 (7)	5.8 (8)
*I should only prescribe DOACs when they have been initiated by others	0.7 (1)	13.0 (18)	5.1 (7)	49.3 (68)	28.3 (39)	3.6 (5)
*Only specialists should initiate the prescribing of DOACs	0.7 (1)	8.7 (12)	10.1 (14)	54.3 (75)	25.4 (35)	0.7 (1)
I am confident in my ability to initiate the prescribing of DOACs	13.0 (18)	48.6 (67)	13.0 (18)	15.9 (22)	5.8 (8)	3.6 (5)
I am competent in initiating the prescribing of DOACs	16.7 (23)	50.0 (69)	14.5 (20)	9.4 (13)	3.6 (5)	5.8 (8)
I find the guidelines on DOACs easy to interpret	5.1 (7)	37.0 (51)	34.8 (48)	15.2 (21)	1.4 (2)	6.5 (9)
*I find it difficult to decide whether to prescribe DOACs or warfarin	1.4 (2)	24.6 (34)	9.4 (13)	49.3 (68)	6.5 (9)	8.7 (12)
*Others have to remind me to prescribe DOACs according to the guidelines	0.7 (1)	6.5 (9)	5.1 (7)	62.3 (86)	12.3 (17)	13 (18)

I have sufficient support from specialists to enable me to prescribe DOACs safely and effectively	8.7 (12)	60.1 (83)	11.6 (16)	7.2 (10)	0	12.3 (17)
*I feel anxious when initiating the prescribing of DOACs	0.7 (1)	16.7 (23)	5.1 (7)	50.7 (70)	11.6 (16)	15.3 (21)

*reverse scored
Component statistics, sum of allocating 1 (strongly disagree) to 5 (strongly agree)
Cronbach's alpha 0.904
Range possible 16-80, with 80 representing best positive score
Midpoint 48
Median 61
IQR 54-64

Table 4. Component 2, responses to items related to 'influences on prescribing' (N=138)

Statement	**Strongly agree % (n)**	**Agree % (n)**	**Unsure % (n)**	**Disagree % (n)**	**Strongly disagree % (n)**	**Missing % (n)**
*Cost is a deterrent to my prescribing of DOACs	3.6 (5)	25.4 (35)	7.2 (10)	47.8 (66)	8.0 (11)	8.0 (11)
*Potentially increased scrutiny of my prescribing by the health board is a deterrent to my prescribing of DOACs	2.9 (4)	16.7 (23)	8.7 (12)	50.7 (70)	13.8 (19)	7.2 (10)
*My prescribing of DOAC is discouraged by my peers	0.7 (1)	3.6 (5)	8.0 (11)	63.9 (88)	16.7 (23)	7.2 (10)
*My prescribing of DOAC is discouraged by my organisation	0.7 (1)	9.4 (13)	15.9 (22)	56.5 (78)	10.1 (14)	7.2 (10)
*My prescribing of DOAC is discouraged by specialists	0.7 (1)	0	12.3 (17)	65.2 (90)	15.2 (21)	6.5 (9)
* Reverse scored Component statistics, sum of allocating 1 (strongly disagree) to 5 (strongly agree) Cronbach's alpha 0.802 Range possible 5-25, with 25 representing best positive score Midpoint 15 Median 19 IQR 17-20						

Table 5. Component 3, responses to items related to 'consequences of prescribing' (N=138)

Statement	**Strongly agree % (n)**	**Agree % (n)**	**Unsure % (n)**	**Disagree % (n)**	**Strongly disagree % (n)**	**Missing % (n)**
Implementing the guidelines on prescribing DOACs will be better for patients	16.7 (23)	60.1 (83)	18.8 (26)	2.2 (3)	0	2.2 (3)
Implementing the guidelines on prescribing DOACs will be better for my NHS organisation	16.7 (23)	55.8 (77)	23.2 (32)	2.9 (4)	0.7 (1)	0.7 (1)
If I prescribe DOACs rather than warfarin, I believe that patients will be treated more effectively	7.2 (10)	21.0 (29)	34.8 (48)	32.6 (45)	2.2 (3)	2.2 (3)
If I prescribe DOACs rather than warfarin, I believe that patients will have less adverse effect	5.8 (8)	14.5 (20)	45.7 (63)	29.7 (41)	2.2 (3)	2.2 (3)
If I prescribe DOACs rather than warfarin, I believe that patients will be treated more cost effectively	2.9 (4)	13.8 (19)	47.8 (66)	29.0 (40)	4.3 (6)	2.2 (3)
Potentially reduced workload in patient monitoring influences my prescribing of DOACs rather than warfarin	5.1 (7)	34.8 (48)	7.2 (10)	39.1 (54)	5.8 (8)	8.0 (11)
Component statistics, sum of allocating 1 (strongly disagree) to 5 (strongly agree) Cronbach's alpha 0.714 Range possible 6-30, with 30 representing best positive score Midpoint 18 Median 19 IQR 17-21.25						

Table 6. Component 4, responses to items related to 'monitoring for safety and effectiveness' (N=138)

Statement	**Strongly agree % (n)**	**Agree % (n)**	**Unsure % (n)**	**Disagree % (n)**	**Strongly disagree % (n)**	**Missing % (n)**
If I prescribe DOACs rather than warfarin, I believe that my management of severe bleeding will be more challenging	10.1 (14)	54.3 (75)	16.7 (23)	15.2 (21)	0.7 (1)	2.9 (4)
I believe that If I prescribe DOACs rather than warfarin, over-anticoagulation will not be easily detected	5.8 (8)	37.0 (51)	29.7 (41)	21.7 (30)	0	5.8 (8)
I believe that If I prescribe DOACs rather than warfarin, under-anticoagulation will not be easily detected	7.2 (10)	36.2 (50)	31.2 (43)	21.0 (29)	0.7 (1)	3.6 (5)
The lack of need for monitoring influences my prescribing of DOACs	10.9 (15)	41.3 (57)	8.7 (12)	24.6 (34)	2.2 (3)	12.3 (17)
The rurality of my practice influences my prescribing of DOACs	9.4 (13)	29.7 (41)	3.6 (5)	26.1 (36)	2.2 (3)	29 (40)
Component statistics, sum of allocating 1 (strongly disagree) to 5 (strongly agree) Cronbach's alpha 0.612 Range possible 5-25, with 25 representing best positive score Midpoint 15 Median 17 IQR 14-19						